

CLIMATE CHANGE ANNUAL REPORT, 2011



Wadi Mujib, Jordan



California Department of Water Resources

TABLE OF CONTENTS

Table of Contents

FIELD STUDIES

Evaluation of Benefits of Meadow Restoration on Sierra Nevada Water Supply	6
Paleohydrology	8
Twitchell and Sherman Island Subsidence Reversal Projects	10

PLANNING, MODELING, AND DATA COLLECTION

Climate Change Technical Advisory Group (CCTAG).....	12
California Water Plan Update – Climate Change (CWP)	14
Analysis of Climate Change for the California Water Plan Update	16
Coordination of Climate Change Analysis Methods for DWR Planning.....	19
Climate Change Basic Data Workgroup	21
Data Collection and Climate Services	22
Using Downscaled Climate Change Information for Water Resources Planning	24
Sensitivity Analysis of Sierra Nevada and Coastal Range Upper Watersheds to Temperature Changes Using SWAT	26
Represent DWR in Interagency and Stakeholder Groups.....	30
National Research Council (NRC) Sea Level Rise Study.....	30

OPERATIONS

Evaluation of Benefits of Reoperation of Water Supply and Flood Protection Systems.....	33
Coordinated Reservoir Operations	35
Cement.....	36

ENERGY & GREENHOUSE GAS EMISSIONS

Water-Energy Subgroup of the Governor’s Climate Action Team (“WETCAT”)	38
Integrated Resource Plan for the State Water Project	40
Emissions Reports to The Climate Registry and the California Air Resources Board	42
Mitigation Team.....	44

BUSINESS PRACTICES & TECHNICAL EXPERTISE

DWR Climate Change Program	47
Climate Change Matrix Team.....	49
Addressing Climate Change in Departmental CEQA Documents.....	50
Sustainability.....	52
Sustainable Facilities Operations - Greenhouse Gas (GHG) Initiatives	57
Environmental Stewardship Policy	59
Provide Assistance for Water Use Efficiency	61

GRANTMAKING & TECHNICAL ASSISTANCE

Integrated Regional Water Management Grant Program	63
Integrated Regional Water Management (IRWM) Climate Change Evaluation	65
Grantee California Environmental Quality Act (CEQA) Documents.....	67
Climate Change Handbook for Regional Water Planning	69
Provide Expert Assistance for Integrated Regional Water Management (IRWM) Plans	71
Provide Assistance for DWR CEQA Documents	73
Federal Grant Programs.....	74
National Scientific and External Coordination Committees	75

PUBLIC OUTREACH

Public Outreach on Climate Change	78
Office of the California State Climatologist.....	82

DWR's Climate Change Program depends fundamentally upon a matrix management approach to execute its mission. Unlike other programs, the Climate Change Program has a relatively small and regionally decentralized staff, employs no consultants, and has neither regulatory authority nor grant funding to influence behavior. So the results you will read about in the following pages are based largely upon the quality of the program's staff, their engagement with and leverage of partners both internal and external, the usefulness of program's guidance and tools, and ultimately the strength of its ideas. Some highlights from 2011 include the establishment and hiring of the Department's first sustainability coordinator (using a Climate Change Program position), the completion of the *Climate Change Handbook for Regional Water Planning*, and the fourth consecutive year of attaining "Climate Action Leader" status with The Climate Registry (giving DWR bragging rights as the only member of the Governor's Climate Action Team to earn such status). Moreover, in December 2011, Governor Brown forayed into climate adaptation, kicking off a series of fora focused on extreme events, starting with a gala gathering at the California Academy of Sciences that also featured former Governor Schwarzenegger (both Governors were in fine form that day).

That said, there remain significant climate change challenges, both without and within DWR. In the world outside the Department, leadership at the international and federal levels is largely a void—with the recent Presidential race a specific disappointment for its lack of dialogue on climate change. The only bright spot in this bleak backdrop is that such inaction makes sub-national efforts like California's all the more important. At the same time, public opinion polling generally shows fewer Americans "believe" in climate change—as if climate change was something akin to the Tooth Fairy or perhaps Santa Claus this time of the year—despite more frequent extreme weather events that scientists now more readily connect to climate change. Closer to home, those who prefer getting their science from talk radio hosts rather than scientists apparently abound in some parts of the state, and have of late taken to attacking our flagship grant program, Integrated Regional Water Management, and its incorporation of climate change. In particular, over the summer, a public meeting on this subject turned ugly for DWR staff—who arrived neither in black helicopters nor blue helmets—made all the worse in that the meeting was formally "hosted" by a county board of supervisors. Internally, in a recent survey of DWR management for its October 2012 offsite, climate change was not cited even once as an important technical or integrative program for the Department, amongst many others that were so noted.

Clearly, our journey to save the planet is unfinished, and frequent potholes, detours, and outright roadblocks should continue to be expected. Nonetheless, as I write this foreword about 2011, 2012 is rapidly drawing to a close, and I already see how efforts fermenting last year have produced a vintage this year, including packed rooms for the new Climate Literacy classes, a reinvigorated and engaged Climate Change Technical Advisory Group, and the establishment of an aggressive Climate Action Plan for DWR. More on those efforts in next year's report.

John Andrew, Assistant Deputy Director

December 12, 2012

FIELD STUDIES

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Evaluation of Benefits of Meadow Restoration on Sierra Nevada Water Supply

Sponsor/Program Manager	FESSRO/DSIWM/Climate Change Team
Project Manager	Harry Spanglet

Project Objective:

Investigate the role of restoring degraded montane meadows in water management in the Sierra Nevada

Project Description:

In a natural, un-degraded condition, mountain meadow communities have deep soils, dense vegetation, and a naturally-developed drainage pattern where water flows across the flat meadow surface and infiltrates the soil; shallow meandering channels then carry water to downstream drainages. Meadows typically remain fully saturated for most of each year and can store substantial quantities of groundwater in their soils, acting as natural reservoirs of water at high elevations. Slow release of water stored in meadow sediments can provide base flow to downstream drainages long after surface runoff has stopped for the season; in addition, the water storage capacity of meadows can buffer the rate of water runoff during snowmelt and reduce peak flows that cause flooding downstream. The net result is a reduction in extremes of runoff, increasing the low flow and reducing peak flows.

Degraded meadows that have been exposed to poor land-use practices, such as overgrazing of livestock, off-highway vehicle traffic, and draining, typically exhibit "gully erosion," in which shallow channels are deeply eroded and all water entering the meadow drains rapidly into stream channels rather than across meadow surfaces. The channelized flow does not allow the soils to become saturated, eliminating the beneficial hydrologic effects of meadow communities and leading to drastic changes in meadow vegetation. Meadow restoration is the practice of reversing the effects of gully erosion by filling gullies and re-establishing a quasi-natural hydrologic regime by redirecting surface flows across meadows, allowing water to infiltrate the sediment, raise groundwater levels, and potentially restore the beneficial hydrologic functions of meadows.

DWR is funding the US Forest Service for a three-year investigation of the hydrologic effects of meadow restoration and how restored meadows can contribute to improved system operation as well as ecosystem functioning. In 2010 the project began meeting the goals of the funding, including: delineating potential meadows using available Geographic Information System (GIS) datasets, delineating meadows in the field and comparing the field delineations to those derived from GIS analysis; assessing meadow condition in a random sample to extrapolate to the condition of all Sierra meadows; installing instrumentation to assess hydrology of undisturbed and restored meadows.

Funding Information:

Project Budget:	\$313,000 (DWR match)	Funding Source:	Prop 84
-----------------	-----------------------	-----------------	---------

**Project Start
Date:**

6/1/2010

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

National Fish and Wildlife Federation

Project Accomplishments for 2011:

- Bibliography of scientific literature pertaining to meadow restoration and hydrology, which indicates that meadow restoration has beneficial effects on streamflow
- An inventory of meadow communities in the Sierra Nevada, which is significantly more accurate than previous inventories. Field verification of initial inventories and additional refinements in methods are being used to increase accuracy of meadow delineation using multispectral aerial photographs and satellite imagery
- The extent and degree of meadow erosion is being quantified by field measurements in a sample of meadows throughout the Sierra Nevada
- instrumentation for determination of meadow water budget, and measurements of hydrologic parameters, in has been installed in nine degraded and undegraded meadow communities meadows
- Flow processes in montane meadows are being modeled and investigated using USGS surface water – groundwater coupled flow model, the results of which predicts the effects of meadow erosion

Project Deliverables/Timeline:

- Literature review of hydrologic effects of montane meadow restoration
- Geographic inventory of meadow communities in the Sierra Nevada
- Evaluation of extent and prevalence of meadow degradation through erosion
- Determination of water budgets for sample of degraded and undegraded meadow communities
- Simulation modeling of meadow hydrology and synthesis of results

Customers:

US Forest Service

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Paleohydrology

Sponsor/Program Manager	John Andrew
Project Manager	Jeanine Jones

Project Objective:

Use paleoclimate information to better understand natural climate variability & develop analog years

Project Description:

The Department executed a contract with the University of Arizona for development of tree-ring reconstructions of paleostreamflows in the Sacramento, San Joaquin, and Klamath River Basins. Extending streamflow records beyond the relatively short period of the historical record provides an improved picture of climate variability and yields data for use in operations model sensitivity analyses and for vulnerability analyses. Very limited fieldwork under the contract began in fall 2010; the final report will be completed in 2013. Additionally, with funds provided by USBR, the University is developing a database of climate analog years for DWR with the paleo data.

Funding Information:

Project Budget:	\$400,000 DWR/\$200,000 USBR	Funding Source:	Prop 84
------------------------	------------------------------	------------------------	---------

Project Start Date:

2010

Project End Date:

DATE	IN PROGRESS	N/A
	X	

External Partners:

University of Arizona

Project Accomplishments for 2011:

2011 was the first full fieldwork season for collecting tree ring samples. Additionally, DWR applied for and received a USBR WaterSmart on behalf of the University, to expand the number of samples collected and for the University to develop a database of climate analog years for DWR using the nearer-term paleo record.

Project Deliverables/Timeline:

1. Reconstructed streamflows for Sacramento, San Joaquin, and Klamath Rivers
2. Database of analog climate years

Customers:

DWR Drought program, Calsim modelers, DFM hydrology branch
--

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Twitchell and Sherman Island Subsidence Reversal Projects

Sponsor/Program Manager

Project Manager

Bryan Brock

Project Objective:

Project Description:

Funding Information:

Project Budget:

Funding Source:

**Project Start
Date:**

**Project End
Date:**

DATE IN PROGRESS N/A

External Partners:

Project Accomplishments for 2011:

Project Deliverables/Timeline:

Customers:

PLANNING, MODELING, AND DATA COLLECTION

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Technical Advisory Group (CCTAG)

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

An external panel of expert advisors will provide Department-wide guidance for Climate Change Scenario selection and methodology for the California Water Plan and various Department planning efforts and projects, future flood needs, and IRWM support.

Project Description:

The CCTAG will advise DWR on the scientific aspects of climate change, its impacts on water resources, the use and creation of planning approaches and analytical tools, and the development of adaptation responses. A standing technical advisory group on climate change impacts and adaptation serving all DWR programs provides external guidance and support for a variety of climate-related issues, including scientific review of climate change models and scenarios, interpretation of scientific information produced by the National Climate Assessment and the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, and informing DWR's climate change adaptation policies. Benefits include consistency in the scientific advice the Department receives on climate change, and the administrative efficiency of not having redundant climate change advisory groups across the Department. The Department's Climate Change Program will oversee and coordinate the CCTAG.

Funding Information:

Project Budget:	\$300,000	Funding Source:	Prop 84
-----------------	-----------	-----------------	---------

Project Start
Date:

2011

Project End
Date:

DATE IN PROGRESS N/A

X

External Partners:

California Water Plan Statewide Water Analysis Network, State Climatologist Office

Project Accomplishments for 2011:

In 2011, letters of qualification were solicited for experts in the following technical categories; Atmospheric science; Hydrology; Civil Engineering/Infrastructure; Environmental science; Climate data and statistics; Social science; Resource Economics; Land use planning; and Climate modeling. A group of experts will be selected to serve the Department for a three-year term, commencing in 2012.

Project Deliverables/Timeline:

In addition to a broad array of technical and policy advice, the CCTAG will provide specific guidance on climate change scenario selection for the California Water Plan, and other planning efforts of the Department, including DWR Framework guidance climate change approach recommendations.

Customers:

In general, the Department of Water Resources is the customer. Specific customers within DWR include: 1) the Climate Change Framework Team, which is developing guidance on the selection of climate change scenarios, approaches and project-level analytical tools; 2) the California Water Plan Update 2013 Statewide Water Analysis Network, which is selecting climate change scenarios; 3) other groups, including IRWM, Flood Management, and the Natural Resources Agency, on the incorporation and consistency of climate change in planning studies and projects.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

California Water Plan Update – Climate Change (CWP)

Sponsor/Program Manager	John Andrew, Paul Massera, Lew Moeller
Project Manager	Elissa Lynn

Project Objective:

Provide greater detail and regionally specific climate change information in Update 2013 than in Update 2009, including regionally appropriate and statewide adaptation and mitigation strategies, resource management strategies, and climate change scenarios decision support.

Project Description:

Climate change stems from a steady gradual increase in global temperatures that has been taking place over recent decades. Determining the local impacts of and response strategies to climate change in California involves climate modeling downscaled to the regional level. Current developments in climate science and research can provide guidance for projecting likely ranges of temperatures and precipitation changes by region. Responding to these hydrologic changes and reducing their impact are known as adaptation strategies. Reducing GHG (Greenhouse Gas) impacts by reducing energy consumption are known as mitigation strategies. Many adaptation and mitigation strategies are conducted at the regional level, so CWP update 2013 will include climate change in the regional reports, based on appropriate hydrologic impact, as well as statewide strategies in the broader document. Strategies and vulnerabilities to climate change will also appear in the Resource Management Strategies. This project will also be tasked with technical assistance to the Statewide Water Analysis Network choice of scenarios related to climate change impacts. These four approaches to incorporating climate change into CWP 2013 will improve upon the initial steps taken in CWP 2009 to include responses to climate change.

Funding Information:

Project Budget:	\$648,000.00	Funding Source:	Prop 84
------------------------	--------------	------------------------	---------

Project Start Date:	2010	Project End Date:	DATE	IN PROGRESS	N/A
				X	

External Partners:

Public Advisory Committee, Statewide Water Analysis Network, Local Water Planners and IRWM's

Project Accomplishments for 2011:

This project established all project management plans for this activity, including Charter, Scope, and Communications Plan. All documents were approved by management, and serve as Project Service Offices templates for similar program management processes. In 2011, work teams were set up for developing content for both the mitigation and adaptation content that will appear in CWP Update 2013 Regional Reports, Resource

Management Strategies, and Key Highlights. Additionally, this project oversaw the re-initiation of a Climate Change Technical Advisory Group (see CCTAG project summary).

Project Deliverables/Timeline:

Regional report content for both mitigation (energy intensity of raw water extraction and conveyance), and adaptation (regionally specific strategies) will be provided to authors in 2012, with final content by CWP Update 2013 release. In addition, climate change benefits or costs to climate change will be evaluated for each Resource Management Strategy. Additional support to CWP 2013 will be seating and soliciting expert advice on climate model scenario selection for use in the “Future Scenario” section of the Water Plan.

Customers:

California Water Plan, Public Advisory Committee, State Agency Steering Committee, the public.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Analysis of Climate Change for the California Water Plan Update

Sponsor/Program Manager	Paul Massera
Project Manager	Rich Juricich

Project Objective:

Quantify alternative scenarios of future water demand and supply conditions and use to evaluate performance of potential water management responses for Water Plan Update 2013

Project Description:

The California Water Plan Update 2013 (CWP 2013) will build upon the scenario planning begun in previous Updates and include an analysis of the performance of different resource management strategies and response packages for the Central Valley under different assumptions about uncertain future conditions. The Water Plan will also evaluate the effect of different assumptions about uncertain future conditions including climate change on future water demand for all 10 hydrologic regions in California. A wide range of scenarios will reflect uncertainty about future population growth, agricultural land use, climate conditions, water use rates, and other factors.

Uncertain future climate conditions are represented by diverse sequences of temperature and precipitation applied to geographically-disaggregated catchment areas in the Water Evaluation and Planning (WEAP) model. Some sequences will be based upon projections of temperature and precipitation from global climate models (Atmosphere-Ocean General Circulation Models—GCMs). Others will be based on historical observations and will be designed to test the effects of drought conditions experienced in the recent past at different times in the future. The Climate Change Technical Advisory Group (Climate TAG) will provide guidance about which specific sequences to evaluate that reflect a wide range of plausible climatic conditions and include periods of droughts similar to those experienced in recent decades.

The CWP Update 2013 will use a subset of climate sequences used by the CWP Update 2009 and the Bay Delta Conservation Plan (BDCP) analysis.

The CWP Update 2009 evaluated 12 sequences of downscaled global predictions of temperature and precipitation, corresponding to the 12 model-emissions scenario combinations selected by the Governor's Climate Action Team (Maurer and Hidalgo, 2008). The GCMs used were:

1. CNRM-CM3 (France)
2. GFDL-CM21 (USA)
3. Micro32med (Japan)
4. MPI-ECHAM5 (Germany)
5. NCAR-CCSM3 (USA)
6. NCAR-PCM1 (USA)

The two emissions scenarios used were the A2 and B1 scenarios:

“The A2 SRES global emissions scenario represents a heterogeneous world with respect to demographics, economic growth, resource use and energy systems, and cultural factors. There is a de-emphasis on globalization, reflected in heterogeneity of economic growth rates and rates and directions of technological change. These and other factors imply continued growth throughout the 21st century of global GHG emissions. By contrast, B1 is a “global sustainability” scenario. Worldwide, environmental protection and quality and human development emerge as key priorities, and there is an increase in international cooperation to address them as well as to convergence in other dimensions. Neither scenario entails explicit climate mitigation policies. The A2 and B1 global emission scenarios were selected to bracket the potential range of emissions and the availability of outputs from global climate models” California Climate Action Team (2009).

Downscaled monthly temperature and climate projections were obtained from the downscaled climate dataset jointly developed by the Lawrence Livermore National Laboratory (LLNL), the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Santa Clara University (SCU), available at <http://gdo-dcp.ucllnl.org>. These data were derived from the World Climate Research Programme's (WCRP) Coupled Model Intercomparison Project Phase 3 (CMIP3) multi-model dataset, and include data from 112 different global climate simulations of 16 global models evaluated for three global emissions scenarios. The projections are available from 1950 to 2099.

The Bay Delta Conservation Plan (BDCP) analysis took a different approach to develop-ing climate scenarios. They created five synthetic sequences of temperature and precipitation (Q1 – Q5) by resampling data from subsets of 112 different GCM-derived sequences:

- Drier, less warming (Q1)
- Drier, more warming (Q2)
- Wetter, more warming (Q3)
- Wetter, less warming (Q4)
- Central tendency (Q5)

Funding Information:

Project Budget:	\$750,000	Funding Source:	Proposition 84
------------------------	-----------	------------------------	----------------

Project Start Date:

July 2010

Project End Date:

DATE	IN PROGRESS	N/A
	X	

External Partners:

MWH, RAND Corporation, Stockholm Environment Institute, National Center for Atmospheric Research

Project Accomplishments for 2011:

Developed and vetted Proof of Concept for Update 2013 scenario analysis with Water Plan stakeholders

Project Deliverables/Timeline:

- Three narrative future scenarios for California describing alternative values for uncertain factors like population growth, land use changes, socioeconomic conditions, technological advancement, and institutional and political changes
- Up to 12 scenarios of future climate conditions (precipitation, temperature) for California's ten hydrologic regions and all Central Valley planning areas selected with advice from the Climate Change Technical Advisory Group
- Quantification of future water demands for California's ten hydrologic regions reflecting the three narrative future scenarios and up to twelve future climate scenarios
- Quantification of future water supplies and demands reflecting the three narrative future scenarios and up to twelve future climate scenarios for all Central Valley planning areas
- Performance criteria for evaluating effectiveness of regional water management responses
- Evaluation of many alternative water management responses using Robust Decision Making for all Central Valley planning areas

Customers:

- Department of Water Resources for support of DWR programs and projects
- Local and regional water planning entities for consideration of alternative future scenarios and water management responses
- California Legislature to meet Water Code requirements
- General public for education on future water issues
- Water Plan advisory groups including the Public Advisory Committee, State Agency Steering Committee, Statewide Water Analysis Network, and Regional Forums.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Coordination of Climate Change Analysis Methods for DWR Planning

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz/Abdul Khan

Project Objective:

Develop a framework and toolbox to guide DWR climate change analysis and ensure consistency, quality and adequacy across all DWR planning documents.

Project Description:

In 2010, DWR began a two-phase project to coordinate the various climate change analysis methods used in DWR planning studies. The first phase of this project was to survey and describe the procedures and methodologies that have been used in the past by DWR and its partners to characterize future climate and analyze the impact of projected changes. The second phase of this project will be to develop guidance and tools for use by DWR project managers to ensure consistency, quality, and adequacy across all programs and planning studies completed by DWR.

Phase I was completed in December 2010 with the publication of "[Climate Change Characterization and Analysis in DWR Planning Studies](#)" by Abdul Khan and Andrew Schwarz. This study is a comprehensive and comparative look at planning studies conducted by DWR and its partner agencies that have addressed climate change.

The study provides the background needed to develop guidance for DWR project managers on selecting and implementing climate change analyses. In addition, it also serves as a review of potential approaches available for other water planning entities as they decide how to address climate change in their planning processes.

Phase II of this project began in 2011 and is anticipated to be completed in 2012. Phase II will result in a guidance document and an accompanying climate change data toolbox/web portal to assist DWR project managers with assessing the need for climate change analysis in their planning activities and guiding decision making for selection of analytical tools, assumptions about future conditions, and analysis procedures. The intent of this activity is to improve consistency across DWR documents and streamline decision making and document review while preserving the flexibility of project managers to tailor analysis procedures to their specific project.

During 2011, a workgroup of DWR staff was assembled with members representing each of the different divisions, branches, and offices that use projected future conditions in their planning activities. The workgroup met several times in 2011 and has developed an outline and approach to providing guidance on climate change characterization and analysis. The workgroup also determined that additional expertise from outside DWR would be required to identify the most appropriate scenarios for characterizing future climate conditions in California. The workgroup developed a scope of work containing specific questions about scenario selection and development for a Climate Change Technical Advisory Committee (CCTAG) to address. A CCTAG, containing outside experts in a variety of fields, will be formed in early 2012 and will take up the scope of work as their first task.

Funding Information:

Project Budget:	\$300,000	Funding Source:	N/A
------------------------	-----------	------------------------	-----

**Project Start
Date:**

2010

**Project End
Date:**

DATE	IN PROGRESS	N/A
------	-------------	-----

X

External Partners:

NOAA, Scripps

Project Accomplishments for 2011:

Formation of Department-wide workgroup, guidance outline, CCTAG Scope of Work.

Project Deliverables/Timeline:

Climate change characterization and analysis guidance document and toolbox

Customers:

DWR project managers

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Basic Data Workgroup

Sponsor/Program Manager	Elissa Lynn, Greg Smith, Michael Anderson
Project Manager	Aaron Cuthbertson

Project Objective:

Assessment and coordination of basic climate data collection efforts across DWR

Project Description:

DWR's Climate Change Basic Data group is composed of representatives from DSIWM and the Division of Flood Management, and DWR's regional offices. The project goals are to assess current climate data acquisition efforts at DWR, promote cooperation and coordination across programs, and strategize on issues of data storage, management, and dissemination.

Funding Information:

Project Budget:	\$120,000	Funding Source:	Prop 84
------------------------	-----------	------------------------	---------

**Project Start
Date:**

May 2011

**Project End
Date:**

DATE	IN PROGRESS	N/A
		X

External Partners:

Western Regional Climate Center

Project Accomplishments for 2011:

The Basic Data Workgroup began in 2011, with monthly meetings to strategize on data collection and management issues within DWR. An internal Memorandum Report on volunteer climate data collection and future recommendations is being prepared for release in 2012. A partnership with the Western Regional Climate Center (WRCC) is being pursued for coordination of statewide climate data collection, storage and dissemination.

Project Deliverables/Timeline:

During 2012, the Basic Data workgroup will focus on strengthening our partnership with the WRCC, inventorying old climate records in the regional offices, and working on integrating existing data collection and management within DWR.

Customers:

State of California Agencies, General Public, DWR Staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Data Collection and Climate Services

Sponsor/Program Manager	
Project Manager	Dr. Michael Anderson

Project Objective:

Collect relevant climate data to support Department's emergency response and planning initiatives and monitor for climate change; provide relevant climate data and value added products to general public

Project Description:

In 2011 DWR continued its development of the Flood Emergency Response Information Service (FERIS). Efforts are underway to link information presented in FERIS to the climate data in the California Climate Data Archive. FERIS will also house a new map-based server for (former State Climatologist) Jim Goodridge's precipitation Depth-Duration-Frequency curves and annual extremes data sets that make up Bulletin 195. This will greatly facilitate the serving of the data which is currently handled through an ftp site with over 4000 spreadsheets. Data gathering for this effort will be transitioned from Jim Goodridge to DWR in the coming year.

For observing data systems, DWR is continuing its partnership with the Earth Systems Research Lab of the National Oceanic and Atmospheric Administration (NOAA) and Scripps Institution of Oceanography to deploy new monitoring equipment for extreme precipitation events. For this network, water vapor measurements, wind profilers, soil moisture sensors and freezing level radar are being deployed across the state. The data from this network is currently served through NOAA's Hydrometeorology Testbed website. Efforts continue to get the data into the California Data Exchange Center. Other observing opportunities that are in their initial stages include elements of the Forecast Coordinated Operations Program and the US Historical Regional Climate Reference Network deployment.

Funding Information:

Project Budget:		Funding Source:	N/A
-----------------	--	-----------------	-----

Project Start
Date:

July 2009

Project End
Date:

DATE	IN PROGRESS	N/A
------	-------------	-----

X

External Partners:

NOAA ESRL, Scripps, GEI, Jim Goodridge

Project Accomplishments for 2011:

Prototype map server, beta version desktop tool, site installations for extreme precipitation monitoring

Project Deliverables/Timeline:

Map based server for B195 data, desktop updating toolkit, full EPN sites with data flow to CDEC

Customers:

DWR, General Public

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Using Downscaled Climate Change Information for Water Resources Planning

Sponsor/Program Manager	Francis Chung
Project Manager	Jianzhong Wang, Hongbing Yin, Francis Chung

Project Objective:

Evaluate Downscaled Climate Model Projection Products for Use in Water Resources Planning

Project Description:

Climate change projections from Global Climate Models (GCMs) typically provide information at a scale that is too large to use for water resource planning. To make the climate change projection information more useful for planning purposes, it is converted to a smaller scale by a process called downscaling. Downscaling methods fall into two categories, statistical downscaling, which is based on historical patterns, and dynamical downscaling, which relies on physical principles and relationships. Both downscaling and the use of downscaled data for water resources planning are evolving areas of research. DWR's activities related to downscaling included:

- Created downscaled data at 2km resolution for California from PRISM-based Bias Corrected Spatial Downscaled (BCSD) data and associated uncertainty estimates
- Comparing dynamical and statistical downscaling methods to better understand the strengths and weaknesses of each method and how that might affect their use for water resources planning purposes
- Generating climate change reservoir inflow projections through a process called double quantile mapping
- Assessing climate change impacts for the Bay Delta Conservation Plan project
- Submitted paper titled "Isolated and integrated effects of sea level rise, seasonal runoff shifts, and annual runoff volume on California's largest water supply" to the *Journal of Hydrology*

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
-----------------	-----	-----------------	-----

Project Start Date:	4/2008	Project End Date:	DATE	IN PROGRESS	N/A
				X	

External Partners:

N/A

Project Accomplishments for 2011:

The paper "Isolated and integrated effects of sea level rise, seasonal runoff shifts, and annual runoff volume on California's largest water supply" has been published in the *Journal of Hydrology*.

Project Deliverables/Timeline:

Develop A New Validation Strategy to Climate Change Impact Study Approaches. The product: climate model projections for use in climate change impact study on CVP/SWP

Customers:

DWR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sensitivity Analysis of Sierra Nevada and Coastal Range Upper Watersheds to Temperature Changes Using SWAT

Sponsor/Program Manager	
Project Manager	Tariq Kadir

Project Objective:

To develop calibrated rainfall/runoff models for the upper watersheds of the Sierra Nevada and Coastal Range mountains for areas tributary to the Sacramento – San Joaquin Delta and determine impacts on stream outflows caused by air temperature warming of 1⁰C to 4⁰C.

Project Description:

Physically-based, distributed hydrologic models are essential tools for evaluating long-term hydrologic changes in California. The semi-distributed Soil Water Assessment Tool (SWAT) is being used to develop individual models of eighteen watersheds of the Sierra Nevada and Coastal Range mountains for areas Tributary to the Sacramento – San Joaquin Delta. A common and consistent database of digital elevation, land use, soil and climate data are used with GIS to develop the SWAT models. Model calibration and validation are based on observed or reconstructed monthly unimpaired streamflows at the watershed outlets. The parallel optimization package is used in model calibration. The calibrated models will be used to study the effect of imposed warming of 1⁰C to 4⁰C on the hydrology of these source watersheds and their impacts on water supply of the Central Valley of California.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
------------------------	-----	------------------------	-----

Project Start Date:

--

Project End Date:

DATE	IN PROGRESS	N/A
	X	

External Partners:

None

Project Accomplishments for 2011:

SWAT models were developed and calibrated for outflows for nine watersheds: Shasta River, Feather River, Yuba River, American River, Merced River, Tuolumne River, Trinity River, Bear River, San Joaquin River, and Putah Creek. For seven of the watersheds (all previously listed except for San Joaquin River and Putah Creek) air temperature warming of 1⁰C to 4⁰C was imposed and impacts of the modified hydrology on outflows were determined.

Project Deliverables/Timeline:

Tangible Products to date:

1. Computer based rainfall/runoff models for nine watersheds in the Sierra Nevada and Coast Range mountains have been developed and calibrated for outflows based on observed or reconstructed streamflows.
2. For seven of the watersheds temperature warming of 1⁰C to 4⁰C was imposed and impacts on outflows determined.

Future Products:

1. Development and calibrated computer based rainfall/runoff models for other watersheds in the Sierra Nevada and Coastal Range mountains and determining impacts of imposed warmings on outflows.
2. Use the developed models to determine the impacts of potential global warming using downscaled GCM results as input.

Customers:

Federal, State, Local, and Private stakeholders in California interested in the impacts of potential climate change on stream flows for areas tributary to the Sacramento – San Joaquin Delta.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Represent DWR in Interagency and Stakeholder Groups

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Regional Climate Staff

Project Objective:

For regional DWR staff to represent DWR in a variety of interagency and stakeholder groups within California

Project Description:

Federal, state, and local agencies, as well as other entities, have been convening workgroups to facilitate discussions in preparing for climate change, to understand the dynamics of water management and the interaction with managing other resources, and to implement the measures identified in the *2009 California Climate Adaptation Strategy*. Regional DWR staff represents DWR in these discussions, communicates the agency's perspectives, provides technical expertise and climate change resources, and reports to the Climate Change Program on relevant information that DWR can use in its own departmental activities.

Funding Information:

Project Budget:	\$60,000/year	Funding Source:	Prop 84
-----------------	---------------	-----------------	---------

Project Start
Date:

January, 2010

Project End
Date:

DATE	IN PROGRESS	N/A
	X	

External Partners:

Federal, state, and local agencies, water and electrical providers, and non-profit entities

Project Accomplishments for 2011:

Regional DWR staff participated in the following workgroups: the California Department of Fish and Game Stakeholder Workgroups; the Climate Action Team (CAT) Biodiversity Working Group; the CAT Climate Change, Land Use, and Infrastructure (CCLU-In) Working Group; Delta Conservancy; California Landscape Conservation Cooperative (CA-LCC); the Bay Area Ecosystem Climate Change Consortium; and the California Water-Energy Coalition (CalWEC), which was formed in 2011 by the Water Research Foundation to bring together water and electricity providers to share information and increase reliability of these resources. Staff was also an active participant in the Communications Committee of CalWEC. As an Interim Steering Committee member of the CA-LCC, staff helped launch the CA-LCC in southern California in January and develop the CA-LCC charter. Staff will continue to represent DWR on the full Steering Committee of the CA-LCC, which convened for the first time in

September and held an in-person meeting in December.

Project Deliverables/Timeline:

Continuing Collaboration

Customers:

Federal, state and local agencies, water and electrical providers, non-profit entities, and DWR climate change program

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

National Research Council (NRC) Sea Level Rise Study

Sponsor/Program Manager	John Andrew
Project Manager	Jeanine Jones

Project Objective:

Contract with National Research Council for science study on West Coast sea level rise

Project Description:

In 2010, the contracting process was completed to put in place funding for the National Research Council (NRC) sea level rise (SLR) study called for in Executive Order S-13-08. DWR executed contracts with four other California state agencies and with Oregon and Washington for their contributions to the West Coast SLR study; three federal agencies provided their share of the funding directly to NRC. Study funding is summarized in the table below; DWR's contribution to the study is in the form of in-kind services to manage the work. DWR's master contact with NRC on behalf of this consortium of agencies was also executed in 2010. The report will provides best available science estimates of a range of likely amounts of local SLR in 2030, 2050, and 2100.

Contributor	California (\$)	Other States (\$)	Federal (\$)
State Water Resources Control Board	95,000		
California Energy Commission	95,000		
Ocean Protection Council	100,000		
Caltrans	95,000		
Washington Department of Ecology		70,000	
Oregon Water Enhancement Board		49,999.99	
US Geological Survey			25,000
National Oceanic and Atmospheric Administration			25,000
US Army Corps of Engineers			25,000
Totals	385,000	119,999.99	75,000

Grand Total: \$579,999.99

Funding Information:

Project Budget:	\$0, DWR	Funding Source:	
------------------------	----------	------------------------	--

**Project Start
Date:**

2010

**Project End
Date:**

June, 2012

External Partners:

States of Oregon & Washington, NOAA, USGS, USACE, Caltrans, SWRCB, CEC, OPC

Project Accomplishments for 2011:

The NRC's committee continued working on the report.

Project Deliverables/Timeline:

The report is expected to be completed in late spring 2012.

Customers:

Same as external partners

OPERATIONS

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Evaluation of Benefits of Reoperation of Water Supply and Flood Protection Systems

Sponsor/Program Manager	Kamyar Guivetchi
Project Manager	Sean Sou

Project Objective:

Improve water supply reliability and flood protection and ecosystem restoration and protection

Project Description:

California's water system is composed of state, federal, and local agencies, each having infrastructure in place to provide water supply and flood control benefits. The current operation of these independent systems is based on physical and legal constraints. Changes in the climate, legal framework, and social values associated with water use may require modifications to existing operations and management procedures, new facilities, and new laws.

Senate Bill X2 1(SB X2 1) authorized DWR to perform a system reoperation study to identify potential reoperation strategies of California's existing water supply and flood protection systems that will optimize the use of existing facilities and groundwater storage capacity. System reoperation refers to changes made to existing operations and management procedures to achieve a certain objective(s). The following are objectives of the System Reoperation Program as defined by SB X2 1:

- a) Integrate flood protection and water supply systems to increase water supply reliability and flood protection, improve water quality, and provide for ecosystem protection and restoration.
- b) Re-operate existing reservoirs, flood facilities, and other water facilities in conjunction with groundwater storage to improve water supply reliability, flood control, and ecosystem protection, and to reduce groundwater overdraft.
- c) Promote more effective groundwater management and protection and greater integration of groundwater and surface water resource uses.
- d) Improve existing water conveyance systems to increase water supply reliability, improve water quality, expand flood protection, and protect and restore ecosystems.

DWR has completed a Plan of Study which described the four phases of carrying out the studies and identified some initial potential reoperation concepts. Appropriate climate change scenarios will be incorporated in the system reoperation study. More information on the System Reoperation Study and the Plan of Study can be found at http://www.water.ca.gov/system_reop/.

DWR will prepare a report that will describe the formulation of reoperation strategies, identify strategies that meet the objectives of the study, evaluate the viable strategies in terms of engineering and economic feasibility, and identify institutional and legal constraints and challenges to implementing the strategies. The studies and report are anticipated to be completed in the Fall of 2014.

Funding Information:

Project Budget:	\$10,000,000	Funding Source:	Prop. 84
------------------------	--------------	------------------------	----------

**Project Start
Date:**

2010

**Project End
Date:**

Fall 2014

External Partners:

U.S. Bureau of Reclamation

Project Accomplishments for 2011:

Completed a Plan of Study

Project Deliverables/Timeline:

Study Report in Fall of 2014

Customers:

General Public

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Coordinated Reservoir Operations

Sponsor/Program Manager

Project Manager

Boone Lek

Project Objective:

Project Description:

Funding Information:

Project Budget:

Funding Source:

**Project Start
Date:**

**Project End
Date:**

DATE IN PROGRESS N/A

External Partners:

Project Accomplishments for 2011:

Project Deliverables/Timeline:

Customers:

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Cement

Sponsor/Program Manager

Project Manager

Gordon Enas

Project Objective:

Project Description:

Funding Information:

Project Budget:

Funding Source:

**Project Start
Date:**

**Project End
Date:**

DATE IN PROGRESS N/A

External Partners:

Project Accomplishments for 2011:

Project Deliverables/Timeline:

Customers:

ENERGY & GREENHOUSE GAS EMISSIONS

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Water-Energy Subgroup of the Governor's Climate Action Team ("WETCAT")

Sponsor/Program Manager	Stein Buer/Kamyar Guivetchi
Project Manager	John Andrew

Project Objective:

Coordinate state-level water-energy planning in support of AB 32

Project Description:

DWR co-chairs the Water-Energy Subgroup—better known as the "WETCAT"—of the Governor's Climate Action Team. The WETCAT coordinates and focuses its efforts on GHG emission reduction actions related to the transport, treatment, delivery and use of water for environmental, agricultural, residential, commercial, institutional, and industrial (CII) needs. In addition to DWR, the principal agencies in the subgroup are State Water Resources Control Board, California Energy Commission, and the California Public Utilities Commission (CPUC). In 2008, the WETCAT developed and proposed five measures to the California Air Resources Board for inclusion in the AB 32 Scoping Plan.

- Water conservation
- Water recycling
- Energy intensity of water systems
- Urban runoff and stormwater reuse
- Renewable energy production

In addition to the WETCAT, DWR actively participates in all of the Climate Action Team Subgroups or Working Groups that focus on specific sectors.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
------------------------	-----	------------------------	-----

**Project Start
Date:**

2006

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

Other State agencies

Project Accomplishments for 2011:

DWR developed an outline for Water-Energy Program. In 2011, the WETCAT continued implementation of these five measures. In particular, DWR led the implementation of the "20x2020" program to reduce per capita urban water use by 20% by year 2020, developed Agricultural Water Management Planning Guidebook and Agricultural Water Measurement Regulations, and has been working on a report of Quantifying the Efficiency of Agricultural Water Use.

Project Deliverables/Timeline:

DWR will complete a Water-Energy Plan by 2013.

Customers:

DWR, CEC, CPUC, SWRCB, OPR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Resource Plan for the State Water Project

Sponsor/Program Manager	
Project Manager	Veronica Hicks

Project Objective:

A 20 year resourcing plan (updated every 3 years) under which the long-term energy needs of the State Water Project's (SWP) would be met.

Project Description:

The Integrated Resource Plan (IRP) is a resourcing plan under which the long-term energy needs of the State Water Project's (SWP) would be met. The IRP considers a balanced approach to meeting the operational, economic, and policy needs of the SWP's water delivery requirements. One component of the IRP is a renewable resources procurement plan that will keep SWP operations consistent with the GHG reduction goals established by the Governor's Executive Order S-03-05 and AB 32.

In developing the IRP, DWR considers numerous operational and regulatory constraints and objectives the SWP is committed to meeting:

- Reliable water deliveries;
- Affordable water deliveries;
- Protection of the natural environment;
- Responsibilities under regulatory authorities; and
- State and federal environmental policy goals.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
------------------------	-----	------------------------	-----

**Project Start
Date:**

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

Project Accomplishments for 2011:

Project accomplishments prior to 2011 include:

- Committed to termination of the long-term power purchase agreement for energy from RG Unit No. 4, a coal plant in Nevada, in July 2013, at which point the SWP's CO₂ emissions levels will be reduced to nearly half of what they were in 1990.
- Completion of IRP 2009.
- Completion of Renewables Procurement Plan.
- Entered into a long-term power purchase agreement with Northern California Power Agency for 33.5% of the output of the Lodi Energy Center, which will be a low GHG-emitting combined cycle combustion turbine generating plant that will be operational in 2012.
- Developed and maintained a transparent and accurate record of the SWP's energy profiles, baselines, and GHG emissions.

Project accomplishments for 2011 include:

- Issued a Request for Proposal for qualified renewable energy to serve the SWP.
- Conducted ongoing investigations of cleaner technologies such as natural gas combustion turbines, wind energy, small hydroelectric generation, and energy efficiency projects for suitability to serve SWP load.
- Completed initial evaluation of adding a second small hydroelectric generating unit at Alamo Powerplant, which would increase SWP's renewables portfolio.
- Initiated discussions and MOU with University of California for solar development adjacent to SWP's Pearblossom Pumping Plant.
- Initiated an energy efficiency improvements study that included the refurbishment and replacement of DWR's hydroelectric generators and pumps at key SWP plant facilities, and is currently studying further refurbishments or replacements at the Gianelli Pumping/Generating Plant and the A.D. Edmonston Pumping Plant, which are the largest SWP loads.

Project Deliverables/Timeline:

Lodi Energy Center will be operational in Summer 2012
Enter into initial contracts for additional renewable resources in Fall 2012
Triennial update to the IRP and renewables procurement plan will be completed in Fall 2012
Long-term power purchase agreement for energy from RG Unit No. 4 will terminate in Summer 2013
Complete initial studies of additional small hydro power plants at or adjacent to SWP facilities in 2014

Customers:

State Water Contractors.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Emissions Reports to The Climate Registry and the California Air Resources Board

Sponsor/Program Manager	Veronica Hicks
Project Manager	Ram Verma/Veronica Hicks

Project Objective:

Reporting and verification of 2010 Greenhouse Gas (GHG) emissions.

Project Description:

DWR reported its estimated total direct and indirect CO₂ emissions to The Climate Registry (TCR). The emissions are the result of the State Water Project (SWP) power purchase transactions. The Department's TCR Greenhouse Gas Emission Report is in the process of verification by an independent third-party verifier. In November 2011, DWR reported the energy generated and consumed by the SWP in 2010, and also the estimated sulfur hexafluoride associated with the SWP's transmission yard circuit breakers, to the California Air Resources Board (ARB).

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
------------------------	-----	------------------------	-----

**Project Start
Date:**

01/03/11

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

The Climate Registry and California Air Resources Board

Project Accomplishments for 2011:

In 2011, CDWR reported 2010 GHG emissions to TCR and CARB. The emissions reported to CARB were verified by a third-party verifier.

CDWR entered into a contract with a verifier for verification of 2010 emissions reported to TCR. Verification of 2010 emissions reported to TCR is in progress.

Project Deliverables/Timeline:

Current Objectives:

1. Compliance with mandatory reporting requirements of AB32
2. Voluntary reporting to TCR and establishing emission baseline
3. Monitoring emissions, and quantities of SF6 and fuels

4. Third party verification of the reported emissions

Future Objectives:

1. Compliance with CARB's Cap and Trade program
2. Tracking and reducing GHG emissions

Tangible results that will result from the project:

1. Compliance with AB32 regulation
2. Compliance with CARB's Cap and Trade Program
3. Tracking GHG Emission reductions
4. Monitoring, controlling and potentially optimizing fuel usage
5. Preparing emission reports

Customers:

Public, CARB, TCR and State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Mitigation Team

Sponsor/Program Manager	John Andrew
Project Manager	Qinqin Liu

Project Objective:

GHG emission reduction in water resource management and planning to implement AB 32 Scoping Plan for climate change mitigation

Project Description:

DWR major actions for GHG emission reduction related to water- energy efficiency for water resource management and planning include development of qualitative and quantitative criteria for water-energy related to California Water Plan Update, providing outreach for agriculture water use efficiency, contribute to WETCAT Climate Action Team management actions , evaluate previous grants for urban water conservation projects for GHG emissions reductions, and coordinate with the other WETCAT agencies for implementation of the AB 32 Scoping Plan.

Funding Information:

Project Budget:	\$300,000	Funding Source:	AB 32
-----------------	-----------	-----------------	-------

Project Start Date:	2011	Project End Date:	DATE	IN PROGRESS	N/A
				X	

External Partners:

WETCAT agencies, agriculture and urban water organizations, the public

Project Accomplishments for 2011:

Developed qualitative and quantitative criteria for water-energy and evaluated the water-energy and GHG emissions for the resource management strategies and regional reports in water plan update 2013, provided outreach for agriculture water conservation by working with the [Conservation Agriculture Systems Institute](#) and the [Center for Irrigation Technology](#), DWR served as co-chairs of the Water-Energy Subgroup of the Governor's Climate Action Team and managed the project to develop joint water-energy plan, evaluated grant contracts for 38 completed urban water conservation projects, and coordinate with the other WETCAT agencies to assist in implementation of the water sector measures in the AB 32 Scoping Plan.

Project Deliverables/Timeline:

Climate change mitigation content for Water Plan Update 2013, and State joint water-energy plan

Customers:

WETCAT agencies, agriculture and urban water organizations, the public.

BUSINESS PRACTICES & TECHNICAL EXPERTISE

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

DWR Climate Change Program

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn/Michael Healey

Project Objective:

The Climate Change Program supports all climate change activities across the Department. Specialists in both adaptation and mitigation are located throughout the regional offices, and headquarters. Program goals include providing regionally-specific climate change information to programs, projects, and documents, by accessing and synthesizing research, data, tools, and topical content for California's unique water management issues with regard to a warming climate.

Project Description:

DWR has had a climate change program since 2009. Executive Manager for Climate Change, John Andrew, expanded the program to provide a team of climate change specialists to serve Department and public on issues related to climate change and water management. Members are matrixed across Departments and Division.

The Climate Change program expanded in 2011 with funding from Proposition 84, and fees from the Air Resources Board under Assembly Bill 32 (Global Warming Solutions Act).

An Environmental Scientist was hired in 2011, to support climate data collection, including assessment and archiving of Department-wide climate data for multiple purposes. The program also added two full time staff to work directly on mitigation for greenhouse gas emissions. Organizationally, the program now funds one Staff ES at headquarters, focused on urban mitigation for climate change; and one ES in the South Central Region Office, focused on agriculture mitigation for climate change.

Funding Information:

Project Budget:	\$1,500,000/year	Funding Sources:	Proposition 84 and AB 32
------------------------	------------------	-------------------------	--------------------------

Project Start Date:

2009

Project End Date:

DATE	IN PROGRESS	N/A
------	-------------	-----

X

External Partners:

Matrix managed across multiple divisions of DWR

Project Accomplishments for 2011:

Climate Change Program staff conducted or supported many of the individual projects listed in this Annual Report. In addition, the program held four Climate Change Matrix Team meetings, for internal coordination on projects and topics related to climate change and water management.

Project Deliverables/Timeline:

The program has funding that should support all activities of the climate change program through FY 15/16.

Customers:

California Water Plan, Integrated Regional Water Management, and FloodSAFE program. The program also provides support to the Governor's Climate Action Team.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Matrix Team

Sponsor/Program Manager	Stein Buer/Kamyar Guivetchi/Gary Bardini
Project Manager	John Andrew

Project Objective:

Communication and coordination of climate change activities across DWR

Project Description:

DWR's Climate Change Matrix Team includes representatives from every division and major program in the Department. The team of approximately 40 staff (membership is on the last page of the annual report) meets quarterly to communicate and coordinate on climate change issues. Meetings regularly feature an external speaker on climate change, Department and State policy discussion, and an update from the State Climatologist.

Funding Information:

Project Budget:	\$40,000	Funding Source:	Various
------------------------	----------	------------------------	---------

Project Start Date:

March 2007

Project End Date:

Ongoing

External Partners:

None

Project Accomplishments for 2011:

The matrix team provided an umbrella forum for development of DWR's Climate Action Plan and its climate change analysis framework.

Project Deliverables/Timeline:

During 2012, the matrix team will focus on sustainability issues.

Customers:

DWR staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Addressing Climate Change in Departmental CEQA Documents

Sponsor/Program Manager	John Andrew/Katy Spanos/Heidi Rooks
Project Manager	Andrew Schwarz

Project Objective:

Provide legal and policy guidance that ensures a high level of consistency and quality in information provided by DWR on CEQA and other environmental documents. And ensure that information provided about GHG emissions and the impacts of climate change on DWR projects is at the forefront of the state of the practice.

Project Description:

In June 2009, the Director formally established the CEQA Climate Change Committee ("C4") to review all climate change analyses in DWR environmental documents and exemption considerations prior to publication. Since 2008, C4 has reviewed and commented on over a dozen environmental impact reports and nearly 80 other Departmental environmental documents. Through these reviews the committee has developed environmental analysis methodologies and reference materials for use by Department staff and consultants, primarily with regard to the GHG emissions caused by Department projects. These methodologies and materials are used to help DWR comply with environmental documentation required to implement laws, regulations, and other operational mandates pertaining to climate change and GHG emissions. These guidance documents also provide a consistent approach to conducting project specific environmental analyses for CEQA compliance documents, biological assessments, permit applications, and other environmental needs. Because of the evolutionary nature of climate change analysis, these documents will be updated periodically to include the most current legal rulings and expert thinking on the subject.

During 2010, the CEQA Climate Change Committee initiated discussions and formed a work group and steering committee to develop a comprehensive approach to addressing climate change. The efforts of this work group have resulted in the development of a three-phase Departmental Climate Action Plan. Each phase of this Climate Action Plan will address a specific area of concern with respect to climate change and the Department's activities. Phase I will be a Greenhouse Gas Reduction Plan documenting historical, current, and projected future emissions of GHGs from DWR activities as well as strategies and targets for reducing future emissions. Phase II will be a Climate Change Analysis Framework to provide DWR project managers with guidance and tools for characterizing future climate conditions and analyzing the impact of climate changes for DWR planning studies such as environmental impact reports, the California Water Plan, and the State Water Project Delivery Reliability Report. Phase III will be a detailed incorporation of adaption in environmental documents, building on "[Managing an Uncertain Future; Climate Change Adaptation Strategies for California's Water](#)" which was published by DWR in October 2008.

Funding Information:

Project Budget:	\$120,000/year	Funding Source:	N/A
-----------------	----------------	-----------------	-----

**Project Start
Date:**

March, 2010

**Project End
Date:**

June, 2012

External Partners:

Attorney General, California Air Resources Board, Office of Planning and Research

Project Accomplishments for 2011:

During 2011, work continued on development of Phase I of the Climate Action Plan-Greenhouse Gas Reduction Plan. Meetings and consultations were conducted with all of the divisions of the Department that have operational control over activities that release GHGs. In January, 2011 the first complete draft for internal review was released. Throughout 2011, additional refinements were made on the draft Greenhouse Gas Reduction Plan and additional drafts were circulated for review by the Climate Change Matrix Team, DWR Governance Board, and DWR staff. Additional reviews were also conducted with outside experts including attorneys from the Attorney General's Office. Work on the Greenhouse Gas Reduction Plan will continue in 2011 and is expected to be completed by mid 2012.

Project Deliverables/Timeline:

Climate Action Plan; Greenhouse Gas Reduction Plan

Customers:

DWR Project Managers, Governor's Office, Air Resources Board

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sustainability

Sponsor/Program Manager

Dale Hoffman-Floerke

Project Manager

Mary Simmerer

Project Objective:

DWR will be a sustainability leader within State government and the California water community

Project Description:

DWR has established a Sustainability Policy, which received approval from former DWR Director Snow, on April, 22, 2009. DWR's Sustainability Policy embodies the goals and directions the Department will take to be a sustainability leader within State government and the California water community. The policy sets initial targets in the following areas:

- Carbon- 50% reduction below 1990 levels by 2020 (consistent with the AB 32 Scoping Plan); 80% reduction below 1990 levels by 2050 (EO S-0-05)
- Energy- Progressive acquisition of 360 GWh of renewable energy resources by 2020; reduce grid-based retail energy demand 20% by 2015; ensure Energy Star purchasing (EO S-2-04)
- Wastewater- Incorporate recycled wastewater and/or greywater into facilities if technically feasible and cost-effective
- Waste- 50% diversion from waste stream by 2020 (AB 1016)
- Water- 20% reduction in per employee water use by 2020 (consistent with SB 7x-7)

Funding Information:

Project Budget:

Funding Source:

N/A

Project Start Date:

April 22, 2009

Project End Date:

DATE IN PROGRESS N/A

X

External Partners:

None

Project Accomplishments for 2011:

2011 Sustainability Accomplishments

Sustainability activities for DWR in 2011 focused both on education and awareness of Sustainability practices and

principles, as well as implementing various Sustainability activities. Following is a list of significant 2011 sustainability accomplishments and efforts. *(For the reader's convenience, the list is grouped alphabetically by activity.)*

- **Agency Sustainability Coordination Efforts**

- California Water Plan- Development of Sustainability Indicators.
 - The California Water Plan, updated every five years, presents the status and trends of California's water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios. The plan also evaluates different combinations of regional and statewide resource management strategies to reduce water demand, increase water supply, reduce flood risk, improve water quality, and enhance environmental and resource stewardship. The evaluations and assessments performed for the plan help identify effective actions and policies for meeting California's resource management objectives in the near term and for several decades to come. The development of sustainability indicators will help in this important work.
- Addition of key Sustainability criteria to DWR Grant approval process
 - Sustainability criteria are being added to appropriate steps in various DWR grant approval processes. The addition of Sustainability criteria to the grant process helps assure that grant dollars are being spent on projects that will bring better value for California citizens.
- Review of various Department Documents for inclusion of Sustainability principles.
 - Sustainability principles at DWR are found across numerous programs. It is important that DWR relay these principals to the public with consistency and clarity. By reviewing major DWR documents for Sustainability principles, consistency of use and meaning is maintained. Some of the documents that contain Sustainability Principles include the Central Valley's Flood Protection Plan and the California Water Plan.

- **Committees**

- Established Bike Committee to advance commuter biking at DWR
 - The Bike Committee is a subcommittee of the Sustainability Working Group and is made up of DWR employees who bike to work frequently and enjoy sharing their expertise. The committee has set doubling the number of bike commuters at DWR as one of their goals. The committee is also committed to promoting bike safety and increased employee health through cycling as well as helping solve issues related to commuter cycling at DWR.
- Established Life Cycle Assessment Committee
 - Also a subcommittee of the Sustainability Working Group, the Life Cycle Assessment (LCA) Committee is looking at various products frequently purchased by DWR and performing a LCA on each product. The final results will help DWR determine the feasibility of using LCA for more products.

- **Education and Awareness Activities**

- Development of Agency Collaboration Portal

- In mid 2011, a web-based tool containing an array of information, news articles, images, etc. on Sustainability was developed and is now open to all DWR employees. See <https://sustainability.water.ca.gov>
- Formation of External Group of Agency Sustainability Coordinators.
 - This external group consists of other State Agency personnel who are involved in Sustainability activities within their respective agencies. The group meets monthly at DWR to discuss Sustainability issues within the public sector.
- Development of Sustainability Awareness Campaign.
 - This Campaign features DWR personnel relating how Sustainability fits within their duties at DWR. Developed in 2011, it will be featured in 2012.
- Earth Day Activities
 - Several presentations on DWR Sustainability activities were offered during April to celebrate Earth Day.
- Sustainability Section in Climate Change Class 201.
 - A class section on Sustainability was developed and is now featured in the new Climate Change Classes.
- Article on sustainable transportation- DWR People News, Winter 2011.
 - DWR's efforts on sustainable transportation were detailed in a 4 page article featuring DWR employees.
- **Energy Efficiency Efforts**
 - Development of proposed new energy efficiency unit personnel job descriptions and duty statements. The proposed new unit will help DWR achieve Energy Efficiency directives.
 - Ongoing benchmarking of current energy use through the identification and location of all DWR retail energy sources and meters.
 - Information Technology energy efficiency.
 - In 2011, DWR, in conjunction with the Natural Resources Agency, completely revised their data centers. Built in the same space as the previous data center, DWR drastically reduced the number of servers, replaced aging hardware and software, and significantly improved the data center energy and cooling elements. The new environment is 90 percent virtualized, and server racks have been reduced from 70 to just four. DWR has reduced its physical server count while increasing the overall server computing capacity through the use of virtualization on dense HP Blades. Cooling and power-consumption efficiency has increased nearly 30 percent. Additionally, over 2.2 million dollars in savings on maintenance and support costs have been realized.
- **Environmental Stewardship Principles**

- DWR adopted Environmental Stewardship Principles in 2010 and in 2011 worked with the Department's Engineering Bulletin, Water Resources Engineering Memorandum (WREM) 58A to assure that the Principles were embedded into the Department's Engineering Practices. The new Bulletin, WREM 58B is scheduled to be adopted by DWR in 2012.

- **Business Services Policy Development**

- A business services policy featuring sustainability principles has been proposed and is currently under review. The intent of the new policy is to ensure that Sustainability objectives are considered in all DWR's purchasing efforts. By focusing on what is purchased prior to actually receiving the items, DWR can significantly reduce its waste and recycling footprints as well as promote environmentally friendly products.

- **Paper Reduction**

- Launched in 2010, Documentum is an enterprise system for managing all record types including video, podcast, images and other digital records as well as traditional media storage such as paper and microfilm
- In 2008, per the 5 year inventory reported to DGS, DWR reported 33,743 total cubic feet of files. That cubic footage included:
 - 4,804 file cabinets and desk drawers of paper.
 - 402,014 boxes of paper files (both office storage and offsite long-term storage).
 - 32 boxes of microfiche.
 - 156 boxes of microfilm.
 - Additionally, the inventory included a total of 199 terabytes of unstructured electronic files. That storage included:
 - 18 terabytes of electronic files on DWR servers.
 - 1 terabyte of files on compact discs.
 - 180 terabytes of files on desktop personal computers which includes 7,971 Word, Excel & PowerPoint Documents

To date, 14 cubic feet of historical records have been completed with another 300 cubic feet in process.

- **Reporting Sustainability Efforts**

- Annual Report

- The 1st sustainability annual report was released in 2011, detailing events and accomplishments from 2010. That report may be accessed at:
- https://sustainability.water.ca.gov/library/-/document_library/view/3364357

- **Water Use Efficiency**

There is an ongoing effort to identify DWR's public water systems, meters and submeters to benchmark current water use.

Project Deliverables/Timeline:

- Carbon- 50% reduction below 1990 levels by 2020 (consistent with the AB 32 Scoping Plan); 80% reduction below 1990 levels by 2050 (EO S-0-05)
- Energy- Progressive acquisition of 360 GWh of renewable energy resources by 2020; reduce grid-based retail energy demand 20% by 2015; ensure Energy Star purchasing (EO S-2-04)
- Wastewater- Incorporate recycled wastewater and/or greywater into facilities if technically feasible and cost-effective
- Waste- 50% diversion from waste stream by 2020 (AB 1016)
- Water- 20% reduction in per employee water use by 2020 (consistent with SB 7x-7)

Customers:

DWR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sustainable Facilities Operations - Greenhouse Gas (GHG) Initiatives

Sponsor/Program Manager	Executive
Project Manager	John Engstrom

Project Objective:

Reduce GHG attributed to Business Operations

Project Description:

DWR will identify, measure, and implement sustainable facilities operations practices to reduce GHG, and educate employees in these practices. The sustainable facilities operations practices to make DWR “greener” will include reducing energy and resource consumption, while lowering greenhouse gas emissions and creating healthier working environments for DWR employees. The development of these enhanced business practices will include:

- DWR will integrate a document management system into its daily business operations. This type of system will reduce paper quantity and create an electronic system for tracking of approvals and electronic retention of documents to save time and resources;
- DWR will continue to promote the Environmentally Preferable Purchasing (EPP) program to utilize procurement methods that provide options for purchasing green” products;
- DWR will increase its efforts to reduce, reuse, recycle, and rethink in all areas of DWR’s daily business activities. DWR will look at continuing to increase its waste reporting metrics under SB 1016 by using annual waste disposal as a factor when evaluating program implementation.
- DWR will promote and implement energy and water efficiency and conservation in all capital and renovation projects as well as operations and maintenance activities within budgetary constraints and programmatic requirements;
- DWR will promote ways to reduce employee business travel for meetings by use of technology like teleconference centers or web casting. In addition, training webinars and other online training opportunities will be investigated to reduce training commute for employees.

Other actions in progress or in planning to promote a more sustainable business include:

- DWR is participating in a loan program through the Department of General Services utilizing American Recovery and Reinvestment Act (ARRA) funds. These funds are being used to update lighting, heating, and cooling systems at DWR’s three visitor centers and the West Sacramento Bryte Lab and Flood Yard facilities. The energy savings for all facilities is anticipated to be approximately 20 percent once the upgrades are completed.
- DWR will continue to educate through outreach activities like the annual Green Week event, *DWR News/People* articles, Pod Cast, and Aqua Net announcements.
- DWR will provide an official office supply reuse center (“Green Pastures”) on the 3rd floor of the Resources Building for new, gently used, or open box office materials that will be available to all DWR employees free of charge.
- Leadership in Energy and Environmental Design (LEED) Buildings- The State Water Project Southern Field Headquarters is currently under construction and is anticipated to become DWR’s first LEED Gold building.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
------------------------	-----	------------------------	-----

**Project Start
Date:**

2010

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

Department of General Services

Project Accomplishments for 2011:

- DWR implemented a Payroll Deduction Transit Pass Program as part of its alternative commute program which subsidizes alternative transportation. This payroll deduction program was proposed from a suggestion made to the Green Team. The program sells monthly transit passes through a pre-tax payroll deduction. This benefits both employees and the Department. The Department reduced its Travel Expense Claims (TEC's) and the employee receives their pass at a reduced cost.
- DWR also actively promotes commuting by bicycle. One of the efforts to increase this alternative mode of transportation is to encourage DWR staff to participate in the Sacramento's regional "May is Bike Month". DWR employees logged 19,850 miles for the month of May in 2011. This put DWR in the top ten of all large business that logged miles around the Sacramento area.
- To support DWR employees that wish to ride their bikes, DWR purchased 50 additional bicycle lockers to promote alternative transportation (bicycling) and the many benefits such as improved health, less stress, reductions in air pollution, traffic congestion and energy consumption.
- DWR completed a pilot Tire Pressure Monitoring Program.
- Environmentally Preferable Purchasing (EPP) Practices - the Purchasing Services Office held purchasing workshops to update the department buyers about the EPP program and why it is in the best interest for the Department to utilize this opportunity. The purchases are reportable in many cases under the mandated goals outlined in the Public Contract Code (PCC) ([12153-12320](#)) for buying recycled-content products (RCPs). The goal of this effort is to increase purchases of RCP's.
- Green Week - Green Week is celebrated in April during Earth Week. The week was highlighted by a different presentation each day that included topics centered around DWR sustainability actions which include carbon offset programs, DWR's participation with a new natural gas plant under construction in Lodi, development of a climate change and water exhibit, and DWR's new Southern Field Division headquarters building being constructed to LEED Gold standard.
- DWR News/People- DWR has promoted sustainability through quarterly "DWR News/People " publication. The articles discuss accomplishments by DWR staff related sustainability a at DWR.
- Green Award for Reduction of Waste Disposal- A DWR sustainability award was created to promote waste reduction and recycling within our Department. The recipient of this Diversion Award disposed the least amount of waste from 18 primary categories and six hazardous waste material categories. The first award was presented in 2008.

Project Deliverables/Timeline:

Continuing GHG Reduction Measures

Customers:

DWR, and State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Environmental Stewardship Policy

Sponsor/Program Manager	Executive
Project Manager	Ted Frink

Project Objective:

Implementation of the Stewardship Policy in DWR programs and projects

Project Description:

In October 2010 DWR's Director Mark Cowin approved the [Environmental Stewardship Policy](#). This policy was developed to advance a Department-wide "Total Resource Management" approach to planning activities and projects. As stated in the Environmental Stewardship Policy, DWR managers can incorporate environmental stewardship into their water supply and flood protection programs and projects in several ways: integrate ecosystem protection and restoration into water storage and conveyance and flood control/management planning; include environmental stewardship and ecosystem protection and restoration as criteria in project funding decisions for all DWR programs; plan for conservation, restoration and maintenance of the biological diversity and natural physical processes of aquatic and related terrestrial ecosystems; and plan and implement projects that contribute to the recovery of aquatic and riparian species listed under the federal and state Endangered Species Acts and other laws, as well as other at-risk species.

In an effort to further integrate and implement the concepts of environmental stewardship and sustainability, the Water Resources Engineering Memorandum (WREM) 58a Update Workgroup was established in November 2010. The WREM series is a means of permanently recording and disseminating engineering management decisions to the staff. [WREM 58a: Coordination of Environmental Requirements](#) (dated October 7, 1997) outlines DWR policy and guidelines on complying with environmental laws and how to facilitate and promote intradepartmental communication and coordination to implement water resource development projects. Once completed, WREM 58b will build on the guidelines provided in WREM 58a to provide implementation guidelines for the Environmental Stewardship Policy. WREM 58b will provide guidelines for consideration and application of Environmental Stewardship Principles along with project-level guidelines to improve DWR's ability to meet or exceed environmental compliance requirements. In November 2011, WREM 58b was reviewed by the Governance board and began the final approval process. Final approval of WREM 58b is expected in early 2012 and work will begin on developing an Environmental Stewardship Implementation Plan.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
-----------------	-----	-----------------	-----

**Project Start
Date:**

November 2010

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

N/A

Project Accomplishments for 2011:

Developed WREM 58b and associated Environmental Stewardship Principles for Governance Board review. The Governance Board advanced it for approval by the Deputy Directors and Director Cowin.

Project Deliverables/Timeline:

Final approval of WREM 58b is expected in early 2012. A new workgroup has formed and will begin development of an Environmental Stewardship Implementation Plan.

Customers:

DWR managers and staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Provide Assistance for Water Use Efficiency

Sponsor/Program Manager

Project Manager

Manucher Alemi

Project Objective:

Project Description:

Funding Information:

Project Budget:

Funding Source:

**Project Start
Date:**

**Project End
Date:**

DATE IN PROGRESS N/A

External Partners:

Project Accomplishments for 2011:

Project Deliverables/Timeline:

Customers:

GRANTMAKING & TECHNICAL ASSISTANCE

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Regional Water Management Grant Program

Sponsor/Program Manager	Tracie Billington
Project Managers	Joe Yun and Zaffar Eusuff

Project Objective:

For Proposition 84 IRWM funding

- Sustainable water management – developing estimates for water supply yield, water savings, improved water quality, etc.
- All IRWM Plans updated to 2010 standards
- More collaborative water management
- Improved integration of projects
- IRWM Plans consider Climate Change vulnerability
- Project selection considers mitigation of greenhouse gas emissions

Project Description:

The IRWM Grant Programs provide financial assistance in a manner that:

- Results in optimal investment of state funding providing maximum benefit to the State's people and environment through improved local and regional water management
- Is transparent and provides for engagement by partner agencies, interest-based stakeholders, and the public on program development and implementation
- Is consistent with legal, legislative, and DWR policy requirements for each funding source

Funding Information:

Project Budget:	Varies annually. Total authorized funding \$1.25B	Funding Source:	Proposition 84 and 50 (IRWM)
------------------------	---	------------------------	------------------------------

Project Start Date:

November 2002

Project End Date:

December 2020

External Partners:

The IRWM grant program is solely administered by DWR. However, in order to deliver the program we work with a variety of state agencies along with 48 Regional Water Management Groups (RWMGs) supporting individual IRWM regions which includes a variety of local and regional water/flood management agencies, land use agencies, state and federal agencies, non-governmental organizations, and tribal entities.

Project Accomplishments for 2011:

- IRWM Planning Grant Solicitation

- Awarded \$21M to 30 Regions; Total Costs = \$32M
- IRWM Implementation Grant Solicitation
 - Awarded \$205M to 25 Regions; total costs = \$986M; funding ~ 200 projects

Project Deliverables/Timeline:

Current program schedule: http://www.water.ca.gov/irwm/docs/ResourcesLinks/Revised-Schedule3_29_12.pdf

Customers:

48 RWMGs supporting individual IRWM regions which includes a variety of local and regional water/flood management agencies, land use agencies, state and federal agencies, non-governmental organizations, and tribal entities.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Regional Water Management (IRWM) Climate Change Evaluation

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

To evaluate current and proposed efforts of Regional Water Management Groups (RWMGs) to incorporate the climate change standard into IRWM plans and to determine the level of assistance needed for DWR to provide these RWMGs

Project Description:

After the passage of Proposition 84, Water Code Section 10541 was updated to define the elements of guidelines developed for approving and distributing the funds. These elements included requiring IRWM plans to consider greenhouse gas (GHG) emissions of identified programs and projects and to evaluate the adaptability to climate change of water management systems in the region. As a result, DWR 2010 guidelines for these funds required IRWM Plans to address both adaptation to the effects of climate change and mitigation of GHG emissions. Applications for Round 1 planning and implementation grants were received in 2010 and 2011, respectively, and funding decisions were finalized in 2011. This project evaluated the extent the climate change standard was addressed by the applications and the level of work the RWMGs were doing or proposing to do to include this standard into their IRWM plan updates.

Funding Information:

Project Budget:	\$6,000	Funding Source:	Prop 84
-----------------	---------	-----------------	---------

Project Start
Date:

July 2011

Project End
Date:

June 2012

External Partners:

N/A

Project Accomplishments for 2011:

UC Berkeley PhD candidate Esther Conrad reviewed existing IRWM plans and the IRWM Proposition 84 Round 1 Planning and Implementation grant proposals and drafted a report on IRWM climate change planning being proposed or done by RWMGs. In developing this report, Ms. Conrad worked directly with the Climate Change and IRWM Programs at DWR. The Climate Change Program in particular supported this effort by sharing the results of a survey that DWR regional climate change specialists conducted in late 2011 with RWMG representatives who received 84 Round 1 planning funds. The survey focused on climate change activities that RWMGs were planning to

include the climate change standard into their IRWM plans.

The report assessed how RWMGs were responding to the climate change requirements in the 2010 IRWM guidelines. The goals of this effort were to share information about the approaches being taken in IRWM regions across the state and to provide recommendations on how DWR might improve guidance and support for RWMGs working to address climate change in their planning processes.

Project Deliverables/Timeline:

Final report on *Climate Change and Integrated Regional Water Management: A Preliminary Assessment of the Response to IRWM Climate Change Requirements* – Expected to be Released in June, 2012

Customers:

RWMGs and DWR IRWM and Climate Change Programs

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Grantee California Environmental Quality Act (CEQA) Documents

Sponsor/Program Manager	John Andrew
Project Manager	Lauma M. Jurkevics

Project Objective:

To provide outreach and guidance on evaluating and documenting impacts resulting from greenhouse gas (GHG) emissions from projects funded by DWR and to assist, as needed, DWR project managers with CEQA reviews of grant projects in the area of GHGs.

Project Description:

Grantees are required to submit their final CEQA documents to DWR to inform DWR's discretionary decision-making on grant awards and disbursement of funds. In 2010, the CEQA Guidelines were updated to explicitly include the emissions of GHGs as a potential environmental impact that must be addressed in CEQA documents. This project provides outreach and guidance materials for grantees and DWR project managers to assist them in evaluating and documenting project impacts from GHGs emissions. The project also provides individual technical assistance to project managers in understanding and analyzing the GHG information of more complex projects.

Funding Information:

Project Budget:	\$50,000/year	Funding Source:	Prop 84
-----------------	---------------	-----------------	---------

Project Start Date:	January, 2010	Project End Date:	DATE	IN PROGRESS	N/A
				X	

External Partners:

N/A

Project Accomplishments for 2011:

In coordination with the Financial Assistance Branch and the Office of Chief Counsel, staff finalized *Informal Guidance for DWR Grantees: GHG Assessment for CEQA Purposes* and *Frequently Asked Questions: CEQA Process for DWR Grant Programs (Including GHG Analysis for CEQA Purposes)* in February, 2011. These documents were posted on DWR's climate change website in the Local and Regional Resources section (<http://www.water.ca.gov/climatechange/resources.cfm>).

Project Deliverables/Timeline:

Process guidance for DWR grant managers for evaluating the GHG component of grantees' CEQA documents – April 2012

Customers:

Grantees and DWR project managers

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Handbook for Regional Water Planning

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz

Project Objective:

Develop a comprehensive handbook that provides information for regional water planners about incorporating climate change and greenhouse gas information in their planning and decision making process using the Integrated Regional Water Management Planning processes as a model regional planning process.

Project Description:

In February 2010, DWR executed an interagency agreement with US EPA Region 9 to complete a handbook for incorporating consideration of climate change into regional water planning and management. In addition to US EPA, the US Army Corps of Engineers, and the Resources Legacy Fund are also partner agencies.

The Climate Change Handbook for Regional Water Planning is a comprehensive guide to incorporating climate change analysis into the regional water planning process. The handbook identifies four major climate change analysis steps: vulnerability assessment, measuring impacts, developing and analyzing strategies, and planning under uncertainty. The handbook contains decision considerations at each step in the process, technical resources, tools, and methodologies to aid practitioners and decision makers. The handbook, though generally applicable to a wide range of regional water planning frameworks, uses the Integrated Regional Water Management (IRWM) process as a model planning process throughout the handbook. The handbook is an important resource for IRWM planning groups who need to meet the Proposition 84 and IE IRWM Grant Guidelines, which for the first time include a requirement to address GHG emissions and the effects of climate change. The handbook does not supplant the existing IRWM guidelines. Instead, it provides detailed guidance on potential approaches to incorporating climate change considerations into the planning process.

Work on the handbook was completed in 2011, including a stakeholder workshop held in May, 2011 at the IRWM Conference in Sacramento and two Technical Advisory Committee workshops held via web-conference in June, 2011. The final handbook was released in November 2011. DWR staff and consultants have made numerous presentations on the handbook in many different forums around the state since the release of the final handbook. Response to the handbook has been extremely positive and the handbook has been held up as an exemplary resource by state and local representatives.

Funding Information:

Project Budget:	\$100,000 (DWR portion of Project Development)	Funding Source:	Prop 84
	\$65,000 (DWR Staff Time)		

**Project Start
Date:**

February, 2010

**Project End
Date:**

November 30, 2011

External Partners:

US EPA, US Army Corps of Engineers, Resources Legacy Fund

Project Accomplishments for 2011:

The project was completed in 2011, providing the first comprehensive climate change planning resource for local and regional water managers and planners.

Project Deliverables/Timeline:

Complete climate change handbook for regional water planning, comprehensive searchable database of climate change resources and tools.

Customers:

Local and regional water planners, engineers, managers, decision makers, and the interested public.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Provide Expert Assistance for Integrated Regional Water Management (IRWM) Plans

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

To provide resources, technical assistance, and outreach to IRWM planning groups, water agencies, and local governments to incorporate climate change mitigation and adaptation into their planning efforts

Project Description:

After the passage of Proposition 84, Water Code Section 10541 was updated to define the elements of guidelines developed for approving and distributing the funds. These elements included requiring IRWM plans to consider greenhouse gas (GHG) emissions of identified programs and projects and to evaluate the adaptability to climate change of water management systems in the region. As a result, DWR 2010 guidelines for these funds required IRWM Plans to address both adaptation to the effects of climate change and mitigation of GHG emissions. This project involves developing and identifying climate change resources and providing technical assistance and outreach to IRWM planning groups, water agencies, and local governments to mitigate for and adapt to climate change.

Funding Information:

Project Budget:	\$400,000/year	Funding Source:	Prop 84
-----------------	----------------	-----------------	---------

Project Start Date:

January, 2010

Project End Date:

In progress

External Partners:

N/A

Project Accomplishments for 2011: What did the Project accomplish in 2011?

Assistance included distributing information at numerous local IRWM stakeholder meetings throughout the year and at one of the *IRWM Regional Acceptance Process Public Workshops* held in January, interacting with local entities at one of the *California Financing Coordinating Committee 2011 Funding Fairs* in March, participating in the Regional Fora held statewide, and finalizing with headquarters staff Frequently Asked Questions and guidance for addressing greenhouse gas emissions in California Environmental Quality Act documents for grantees. In addition, headquarters staff presented a special climate change session at DWR's IRWM Conference held in May and finalized in November for web-posting on December 1st the *Climate Change Handbook for Regional Water Planning* to assist local IRWM groups in integrating climate change into their plans. DWR staff provided a synopsis of this handbook and its use in IRWM planning at the December *IRWM Process Improvement Workshops* held statewide.

Surveys also were conducted in 2011 to determine the extent of knowledge and assistance needed to address climate change for those grantees awarded DWR Proposition 84 IRWM planning grants. Staff also participated in the Government Alliance Pillar of the Santa Ana Watershed Project Authority (SAWPA) in the update of its IRWM plan, *One Water One Watershed*, and assisted with the planning of SAWPA's climate change workshop that occurred in early 2012.

Staff experts from headquarters and the regional offices continued to update DWR's climate change website (<http://www.water.ca.gov/climatechange/>) with new resources and publications, created a climate blog (<http://www.water.ca.gov/climatechange/blog/>), continued dissemination of the Climate News Digest (<http://www.water.ca.gov/climatechange/news.cfm>), drafted a summary report on the collection of historical climate data by volunteers, and worked with state climatologists on analyzing statewide precipitation data. The climate blog, named *Current Perspectives*, featured short articles written by water resource and climate change experts and professionals from DWR and around the world. The intent was to provide a forum for interesting perspectives on climate change and water resources, stories of successful climate change adaptation and mitigation projects and programs, and creative viewpoints on potential strategies for addressing climate change challenges. The blog included perspectives from DWR visitors from Australia, the Netherlands, and Canada, from a sustainability coordinator with Orange County Public Works, and from a high school student in Los Angeles.

As part of an ongoing effort to organize and make use of historical climate data, DWR staff surveyed the regional offices and developed a summary and status report on data collection. Some regional offices have been collecting climate data from volunteers since the 1960s. The draft report not only summarized this collection, but also recommended methods to preserve historical data and prioritize climate stations and discussed the future of these volunteer networks. Staff also worked with retired State Climatologist Jim Goodridge to apply quality assurance and quality control standards on statewide precipitation data, to integrate those data into Geographic Information Systems, and to develop mapping for multiple products. Jim continues to provide Michael Anderson, the current State Climatologist, his data, analyses, and products. A DWR climate data team has been assembled to move these efforts forward and will lead the collection, organization, storage, analysis, and dissemination efforts of climate data into the future to assist planning work, including IRWM plans.

Project Deliverables/Timeline: What are the current or future objectives of the project? Create a list of tangible products that have/will result(ed) from project.

2012 presentations on climate change resources, mitigation and adaptation, and the climate change handbook for specific workshops, including the following:
DWR's 2012 Regional Fora (January, April, May, and Summer/Fall);
Santa Ana River Watershed Climate Change Workshop (February);
University of Riverside's groundwater conference (February);
Central and Southern California: IRWMP Planning and Climate Change (March);
Governor's Office of Planning and Research's *Confronting Climate Change: A Focus on Local Government Impacts, Actions and Resources* (April); and
Council for Watershed Health's *The Mediterranean City 2012: A Conference on Climate Change Adaptation* (June).

Customers:

IRWM planning groups, water agencies, and local governments

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Provide Assistance for DWR CEQA Documents

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz

Project Objective:

Provide DWR staff with technical assistance on climate change and GHG emissions information for DWR CEQA documents.

Project Description:

DWR staff, located in the four regional offices, also provides technical assistance to project managers to incorporate climate change into their CEQA documents for DWR projects. This work will include indentifying needed work and providing advice regarding sources of data and analysis.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
------------------------	-----	------------------------	-----

**Project Start
Date:**

2009

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

None

Project Accomplishments for 2011:

Technical assistance provided for numerous CEQA documents

Project Deliverables/Timeline:**Customers:**

DWR Staff working on CEQA documents

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Federal Grant Programs

Sponsor/Program Manager**Project Manager**

Jeanine Jones

Project Objective:

Seek federal funding where applicable for climate-related activities, particularly research activities

Project Description:

Grant Applications for Federal Funding

Funding Information:**Project Budget:**

N/A

Funding Source:

N/A

**Project Start
Date:**

2008

**Project End
Date:**

DATE	IN PROGRESS	N/A
	X	

External Partners:

University of Arizona, NASA Ames, USGS, USDA NASS, CSU Monterey Bay

Project Accomplishments for 2011:

In 2011, successful grant applications were submitted to USBR's WaterSmart program on behalf of the University of Arizona for the tree ring streamflow reconstructions project, and to NASA's ROSES program on behalf of the NASA Ames Center & partners for use of remote sensing to quantify drought-fallowed agricultural lands in the Central Valley. The grant funds go the academic researchers, not DWR.

Project Deliverables/Timeline:

Funding for both grants will be received in 2012. The U of AZ's grant will expand the number of tree-ring samples collected for the streamflow reconstructions and will additionally provide a database of climate analog years. These deliverables should be available by the end of 2013. The NASA grant will ultimately provide a web-based application for quantifying fallowed acreage; the duration of the research project is for up to 4 years, depending on availability of federal funding in the out years.

Customers:

DWR Divisions

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

National Scientific and External Coordination Committees

Sponsor/Program Manager	Executive
Project Manager	Jeanine Jones

Project Objective:

Represent DWR at interstate, national, and international levels on climate-related matters

Project Description:

During 2011, DWR staff again engaged with interstate and national climate change efforts. Jeanine Jones served on NOAA's Climate Working Group, a subcommittee of NOAA's Science Advisory Board, and on USEPA's State and Tribal Council, a federal climate change advisory committee. She also represented the Western States Water Council (WSWC) on a technical advisory committee to the federal Climate Change and Western Water Group (a coalition of USBR, USACE, NOAA, and USGS). She served on the Western Governors' Association Climate Adaptation Workgroup, and chaired the WSWC Climate Subcommittee. She continued to develop a federal agency/California climate change adaptation workgroup, which meets on an ad hoc basis via conference call.

Funding Information:

Project Budget:	N/A	Funding Source:	N/A
-----------------	-----	-----------------	-----

Project Start
Date:

--

Project End
Date:

DATE	IN PROGRESS	N/A
	X	

External Partners:

NOAA, USBR, USACE, USGS, NOAA RISAs

Project Accomplishments for 2011:

Co-sponsored hydrologic non-stationarity workshop with WSWC. Arranged for WSWC adoption of resolution in support of specified extreme weather events actions. Worked with federal research community to develop a whitepaper for a 21st century Western extreme precipitation observing system. Co-sponsored workshop with NOAA RISAs on climate change/extreme events.

Project Deliverables/Timeline:

Continue to influence federal agency decisions regarding climate change programs, with a near-term focus on extreme events. In 2012, hold follow-up workshop on extreme events with NOAA RISAs, and a policy-oriented workshop with WSWC. Begin working with WSWC and WGA on congressional reauthorization of the National

Integrated Drought Information System legislation. Serve on American Meteorology Society committee on water resources applications.

Customers:

Other public agencies

PUBLIC OUTREACH

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Public Outreach on Climate Change

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

DWR is actively engaged in outreach efforts internal to the Department, as well as with multiple partners on the water resources impacts of climate change. The focus is on public awareness, partnerships, adaptation and mitigation strategies. DWR also maintains a climate change website which provides the opportunity for the general public to e-mail climate change inquiries to DWR staff.

Project Description:

Public Outreach – Exhibits



DWR opened an exhibit on climate change and water at the Long Beach Aquarium in October 2011. The exhibit emphasizes that climate is highly changeable, whether due to natural variability or anthropogenic forcing, and compares paleoclimate conditions that existed in California's past to predicted warming by 2100. The exhibit points out that California's water infrastructure was designed on the basis of a very short climatic record, and would not be able to handle wet and dry extremes that were observed in the paleoclimate record or are projected to occur in the future. The Aquarium receives nearly two million visitors annually.

Included in exhibit opening festivities, DWR sponsored a series of talks for Long Beach Aquarium on different aspects of water and climate change, on October 20, 24, 27, and November 3 and 10, 2011.

Additional planning was done in 2011 for the Fossil Discovery Center in Madera, for a DWR-designed climate change exhibit. Due to fiscal and time constraints, the display will not be in place until 2012.

Public meetings

DWR staff made numerous public presentations on climate change in 2011 (a list is provided in the Accomplishments section), and attended many public meetings on behalf of the climate change program.

Workshops

Western States Water Council workshop on impacts of climate change on extreme events/severe weather, San Diego, March 21-23.

Department of the Interior Southwest Climate Center (University of Arizona) workshop on climate change and flood hydrology, San Diego, May 19-20.

Western States Water Council weather forecasting workshop, Idaho Falls, October 5.

DWR Workshop on Winter Water conditions Outlook and Predicting Extreme Events, San Diego, Nov 17-18.

Reports/Articles

The Climate News Digest is a compilation of articles, reports, blogs, legislative updates, and other resources related to climate change that is intended to keep DWR staff members up to speed on a variety of current climate change-related issues. Current and archived Climate News Digests are available to the public approximately every three weeks at <http://dwrclimatechange.water.ca.gov/digest.html>.

"Isolated and integrated effects of sea level rise, seasonal runoff shifts, and annual runoff volume on California's largest water supply", Jianzhong Wang, Hongbing Yin, Francis Chung, Bay-Delta Office, DWR, *Journal of Hydrology*. May, 2011.

Project Accomplishments for 2011:

Climate Literacy 101 DWR Training Class: held December, 2011.

Climate Literacy Class 101 is designed to inform DWR staff about the climate and climate change issues that relate to water management in California. Introductory level presentations will be given on the weather and climate of California; hydrologic change measurement and analysis; Greenhouse gas emissions, Internet resources and literature; impacts to California water management; DWR's climate change responses, strategies and activities; state and federal regulations; and research and science updates. A group activity will bring together individual experience and course training, to put climate change into context for the various regions of the State. In addition to background information, participants will engage in discussions about climate change and receive resources that facilitate both their work and their ability to impart reliable information to society at large.

In addition, staff developed Climate Literacy 201 DWR Training Class, which will begin in 2012.

Presentations on Climate Change by DWR Staff in 2011

Jamie Anderson

Moderator, California Water and Environmental Modeling Forum Conference, March, Monterey

Michael Anderson

"Climate Change and Water Resources in California," delegation from Macedonia, February, Sacramento

"Incorporating Climate Change into the Central Valley Flood Protection Plan," Advances in Climate Change Assessment, California Water and Environmental Modeling Forum Conference, March, Monterey

"Planning for extreme events in a changing climate," Western States Water Council, March, Washington, DC

"Dealing with extremes in operational and planning environments," ASCE Climate Change Symposium, May, Palm Springs

"Threshold Analysis Approach for Incorporating Climate Change into the CVFPP," SAME, October, Sacramento

"General discussions with other western SCs and federal resource agency partners on climate change and observed data and the intersection for data services," Western Extension Research Activity, WERA-102, November, Davis and Monterey

John Andrew

Sierra Institute, January, Chester

UC Berkeley Institute for International Studies, Berkeley

UC Berkeley Goldman School of Public Policy, Berkeley

Center for Safe Energy, June, Sacramento

Hydrovision, July, Sacramento

CLE CEQA Conference, August, San Francisco

UC Davis King School of Law, September, Davis

Sierra College Natural History Museum, October, Rocklin

Erin Chappell

"Climate Change Program at DWR", delegation from Macedonia, February, Sacramento

"Climate Change Program at DWR", delegation from Canada, February, Sacramento

"Climate Change Activities at DWR", delegation from Japan, December, Sacramento

Pete Coombe

"California Climate, Extreme Events, and Climate Change Implications", Sacramento River Conservation Area Forum, February, Willows

"Climate Variation, Storm Frequency, and Extreme Precipitation in California", Book in Common, California State University Chico, November, Chico

"California Meteorology and Global Weather Patterns", Sacramento River Conservation Area Forum, November, Willows

Messele Ejeta

"A New Insight towards Establishing a Baseline for Uncertainty Analysis in Projected Climate Change," Advances in Climate Change Assessment, California Water and Environmental Modeling Forum Conference, March, Monterey

Lauma M. Jurkevics

Two presentations on "Climate Change at the DWR," Thousand Oaks High School 2nd Annual Sustainability Summit, January, Thousand Oaks

Poster presentations: *Climate Change at the Department of Water Resources* and *Climate Change: Stressing Our Water Systems*, Fairfax High School Planeteers' Earth Day Event, April, Los Angeles

"Using the Climate Change Handbook for IRWM Planning," DWR IRWM Process Improvements Workshop, December, Chino

Tariq Kadir

"Impact of Warming on Outflows from Selected Upper Watersheds in California," Advances in Climate Change Assessment, California Water and Environmental Modeling Forum Conference, March, Monterey

Maury Roos

"Can we save the California Delta?", at International Committee on Irrigation and Drainage conference working group on Climate Change, October, Tehran, Iran

Andrew Schwarz

Workgroup discussion and coordination. Sacramento Regional Air Quality Control Board and Army Corps of Engineers Coordination Group. March, Sacramento

"Climate Change handbook for IRWM", CA/NV chapter of AWWA Conference. March, Long Beach

Poster presentation: "Climate Change Characterization and Analysis in California Water Planning Studies". World Environmental & Water Resources Congress. May, Palm Springs

"DWR Resources for Meeting the IRWM Climate Change Standard" IRWM Conference. May, Sacramento

"GHG analysis and cumulative impacts analysis for CEQA" USBR Biennial Environmental Compliance Conference May, Sacramento

Michelle Selmon

"Climate Change, Water Resources, & Land Use Planning in California" - Seminar: *Water Planning for Commercial, Residential and Industrial Development: Creating a Defensible Water Supply*, October, Santa Monica

Jianzhong (Jay) Wang

"Recent Developments and Comparisons of Statistical and Dynamical Downscaling Techniques," Advances in Climate Change Assessment, California Water and Environmental Modeling Forum Conference, March, Monterey

Funding Information:

Project Budget:	\$100,000	Funding Source:	Prop 84
------------------------	-----------	------------------------	---------

Project Start Date:	2007	Project End Date:	DATE	IN PROGRESS	N/A
				X	

External Partners:

Long Beach Aquarium, DWR Training Office
--

Customers:

Public, DWR

Office of the California State Climatologist

Dr. Michael Anderson-

The California Office of the State Climatologist (OSC) is housed in the California Department of Water Resources (DWR) Division of Flood Management. Interacting with other divisions within DWR which makes up the state climate office (SCO), Western Regional Climate Center (WRCC), and the California Nevada Applications RISA, the OSC provides expertise and a growing range of climate services for California.

Work continued on many fronts over the past year. NOAA released its update to the rainfall frequency product for California and is currently available online. California's Bulletin 195, a compilation of depth duration frequency curves, continues to be updated with the help of retired State Climatologist, Jim Goodridge. Efforts continue to bring the Jim's computational methods into an automated structure within DWR and examine ways to address climate change in the Bulletin 195. Both of these products will be used in an effort to produce hydrologic information for floodplain mapping and other hydrologic and hydraulic studies associated with California's [FloodSAFE](#) program.

Collaboration with NOAA and Scripps Institute of Oceanography continues on the development of an extreme precipitation monitoring network that will include GPS-Met stations to monitor atmospheric water vapor, soil moisture sensors, and vertically pointing radar to detect freezing level in the atmosphere. The project, born out of NOAA's Hydrometeorological Testbed work in the American River watershed, is a five-year effort to lay out the initial components to a statewide monitoring network to improve precipitation forecasts and increase lead time for flood mitigation actions. The final configuration of the initial investment of the network is shown in Figure 1. This effort was presented at a Western States Water Council Meeting on extremes and interest was expressed in determining the feasibility of creating a west-wide network. NOAA's Earth Systems Research Laboratory was asked to develop a concept of such a network with input from the California State Climatologist and Scripps Institute of Oceanography.

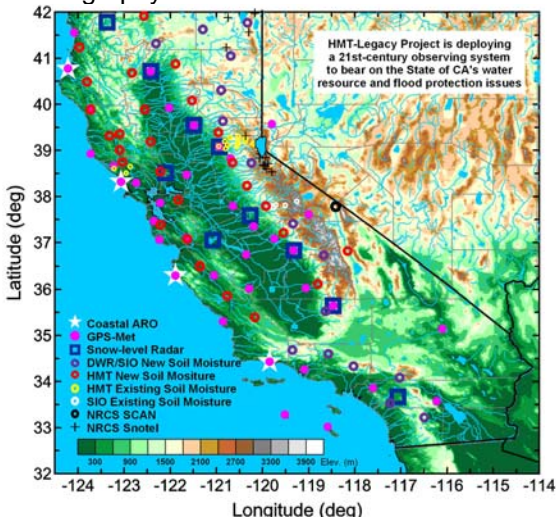


Figure 1. Final buildout plan for 21st Century Observing Network project with NOAA ESRL and Scripps.

The California State Climatologist is also partnering with the California Nevada Applications (CNAP) RISA and NOAA for a National Interagency Drought Information System (NIDIS) pilot project in California. Four activities are beginning focusing on different geographic areas of California: south-coastal urban, Klamath basin, Russian basin, and Central Valley. Anne Steinemann of the CNAP RISA is acting as the State coordinator of the projects. The projects will run for two years and look to develop new data serving methods tailored to each region's specific needs.

California is now in year 4 of CoCoRaHS. Over 850 volunteers have signed up with NWS Weather Forecast Offices taking the lead as regional coordinators with help from some DWR personnel.

Observers are located in 53 of California's 58 counties. Approximately 9000 reports are submitted per month from California's CoCoRaHS volunteers. A summary of activity is provided in the State Climatologist monthly summaries.

Data serving for California climate data improved this past year with the help of a collaborative project between DWR and Western Region Climate Center. Data analysis tools such as histograms and wind rose graphics have been developed for the California Climate Data Archive located at Western Region Climate Center. Further collaborations are being explored including precipitation data archiving associated with the Bulletin 195. Data serving continues via the web, phone and email. A new interface for spatial depictions of data in the California Data Exchange Center is now operational internally. No release date has been set for external use.

Travel and presentations were prominent again this past year. Presentations and/or session moderating duties included meetings for the California Water and Environment Modeling Forum, California Cooperative Snow Surveys Annual Meeting, invited talks at different locations within California including the Nevada County Master Gardeners. Out-of-state travel was limited this past year due to budget problems and will continue to be a challenge in the coming year.

The annual WERA-102 Committee meeting, a meeting of western State Climatologists, the Western Region Climate Center, and federal resource agency partners was hosted by the OSC and the John Muir Institute for the Environment at the University of California at Davis. Discussions were held on data collection, state of the National Climate Service, and climate change work being carried out in different states. Next year's meeting will be in Corvallis, OR to discuss the crossroads of historical data and climate projection data that is used in resource management studies.

The State Climatologist has also been involved in the Department's climate change matrix team, the Climate Change Technical Advisory Group, the FloodSafe's Central Valley Hydrology Study and Central Valley Flood Protection Plan, and has recently joined the national Hydrologic Frequency Analysis Work Group. The climate change matrix team meets quarterly to discuss all things climate change related to the Department. The Climate Change Technical Advisory Group is a collection of 15 agency, academic, and private practice personnel with expertise in climate change. The California State Climatologist is a permanent member on the committee while other seats are 3-year commitments. The group will provide input and feedback on climate change issues relevant to the Department. The Central Valley Hydrology Study is developing new design hydrology data to help the Department's floodplain mapping and flood project studies activities. This effort will include a climate change component in which the State Climatologist will be taking a lead role. The Central Valley Flood Protection Plan (CVFPP) is a 5-year plan that lays out the flood protection project activities that need to be carried out for the State. The climate change working group developed a threshold method to account for climate change in flood management planning. The document is available on the CVFPP website. The national Hydrologic Frequency Analysis Workgroup is a collection of agency, academic and private practice personnel who are investigating the possibility of updating the national flood frequency analysis guidelines.

The California State Climatologist also serves on the American Society of Civil Engineers Environmental Water Resources Institute's Hydroclimate Committee which works to raise awareness of links between climate and water management and associated research.

Work continues through the University of California Office of the President Climate Services Contract. Activity ranges from water year outlook workshops to modeling studies for flood management to field monitoring installation programs. The contract greatly expands the capabilities of project execution for the State Climate Office.

Looking ahead to the coming year, the California OSC plans to continue coordination of activities with the WRCC and the California Climate Data Archive, and continue development of the website and its capabilities to improve data serving. The State Climatologist will also continue efforts to engage climate researchers active in the State and continue collaborative efforts with NOAA personnel and others. Efforts will likely focus on extremes due to the NIDIS pilot activities and continued investment in the FloodSAFE program.

Climate Change Matrix Team		
----------------------------	--	--

Executive Sponsors (in 2011):, Stein Buer, Kamyar Guivetchi, Gary Bardini

Jim Goodridge

Michelle Selmon

Ajay Goyal

Mary Simmerer

John Andrew, Chair

Sergio Guillen

Greg Smith

Linda Ackley

Kamyar Guivetchi

Harry Spanglet

Manucher Alemi

Michael Healey

Katy Spanos

Curtis Anderson

Veronica Hicks

Jim Spence

Jamie Anderson

Ray Hoagland

Shem Stygar

Michael Anderson

Maria Hollister

Charles Toney

Jeremy Arrich

Jeanine Jones

Ram P. Verma

Peggy Bernardy

Rich Juricich

Michael Werner

Tracy Billington

Lauma Jurkevics

David Williams

Steve Bradley

Russell Kanz

Waiman Yip

Erin Chappell

Kathy Kelly

Francis Chung

Abdul Khan

Jamie Cole

Jim Lin

Rob Cooke

Qinqin Liu

Peter Coombe

Elissa Lynn

Mark Cowin

Romain Maendly

Holly Cronin

Paul Massera

Aaron Cuthbertson

Jennifer Morales

Gordon Enas

Dave Mraz

John Engstrom

Gail Newton

Teresa Engstrom

Roy Peterson

Y-Nhi Enzler

Rick Ramirez

Ted Frink

Heidi Rooks

Mehdi Gandomi

Maury Roos

Steven Garcia

Andrew Schwarz

